REMARKS

Present Status of the Application

Claims 1-5 are pending of which claims 1 and 4 have been amended without prejudice or disclaimer in order to more explicitly describe the claimed invention. The paragraph [0012] in the specification has been added with concentrations of implanted ions for the extended drain region 50, the drain region 52, N-well 30, the source region 56 and the N^+ region 55. It is believed that no new matter adds by way of amendments made to claims or otherwise to the application. For at least the foregoing reason, Applicants respectfully submit that claims 1-5 patently define over prior art of record and reconsideration of this application is respectfully requested.

Discussion of objection to claim under 35 USC 112

2. Claims 1-5 are rejected under 35 USC 112, 2nd paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 uses the terms "extended drain region, ""drain region, " and "source region." However the specification does not disclose the amount of the doping that the "extended drain region " or the "drain region" contains to differentiate it from the N-well and the n+ drain diffusion region. Therefore, the metes and bounds of "extended drain region, " ""drain region, " and "source region." are unclear to the examiner. The examiner has interpreted the "extended drain region, " ""drain region, " and

"source region." as having the concentration as the n well, thus making these regions indistinguishable from the rest of the n well.

5. *The examiner believe that this claim was intended to be dependent on claim 3 and not claim 1 but is not certain.*

In response thereto, Applicants would like to thank the Examiner for pointing out the vague points in the specification and provide the following arguments to transverse the above objections. First of all, concentrations of implanted ions for the extended drain region 50, the drain region 52, N-well 30, the source region 56 and the N^+ region 55 have been added into the amended paragraph [0012] in the specification so as to accurately define these regions. However, as assumed by the examiner, in fact, the ion-doped concentrations of the extended drain region 50, the boundary between the drain region 52 and N-well 30, and the N-well 30 are substantially identical. It is for the benefit of conveniently describing and distinguishing different regions in the N well 33 that applicants named these regions with different terms although these regions have the same ion-doped concentration with the N well. As a result, the terms of "extended drain region," "the drain region" and "source region" in the independent claim 1 are clarified by adding the ion-doped concentrations in these regions in paragraph [0012] in the specification.

Furthermore, the claim 4 is amended so as to be dependent on the claim 3 not claim 1.

Discussion of the claim rejection under 35 USC 103(a)

7. Claims 1, 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsui et al., "Integration of power LDMOS into low-voltage 0.5 μm BICMOS technology, "International Electron Device Meeting , 1992, Technical Digest, p.27-30 in view of Hossain .(US 6,448,625 B1).

8. So far as understood in claims 1 and 5, Tsui et al., "Integration of power LDMOS into low-voltage 0.5 μm BICMOS technology, International Electron Device Meeting, 1992, Technical Digest, p.27-30 (hereinafter referred to "Tsui"), discloses a similar device.

Tsui does not disclose the use of p-field region in the n-well region. However, the use of such region is well known in the art. Hossain discloses the use pf p-field region (108) in Fig.3C. Fig. 3C of Hossain shows that there are several p-fields (108) on the left side of the figure. These p-fields generate junction fields in the n-well to deplete a drift region (col. 2, lines 58-60). Hossain states that using these regions has the benefit of increasing the breakdown voltage (col. 2, lines 60-61). In view of Hossain, it would be obvious to use p-field region in the device of Tsui.

Applicants respectfully disagree and traverse the above rejections as follows.

The invention motives of the present application are to increase breakdown voltage of LDMOS (lateral double diffuse MOS). Tsui et al., "Integration of power LDMOS into low-voltage 0.5 μm BICMOS technology, International Electron Device Meeting, 1992, Technical

Digest, p.27-30 (hereinafter referred to "Tsui"), mainly discloses a integrated technology for LDMOS and BiCMOS. However, from Fig.1 in Tsui, an LDMOS is isolated by p-well/p buried layer, whose ion-doped concentration is higher than that of p substrate, to preventing the drain current from flowing around the substrate. Instead, the present application implements an N-well as disclosed in the amended independent claim1 to isolate the LDMOS transistor. Therefore, Tsui and the present application implement different isolation structures for the LDMOS. Besides, Tsui fails to teach, suggest or disclose a use of p-field regions in the N-well for increasing breakdown voltage of the LDMOS, as claimed in the independent claim 1. Although US 6,448,625 B1(Hossain, hereinafter referred to Hossain) discloses a p-top layer 108in an N-well 113 and thus the Examiner alleges that the incorporating p-top layer 108 taught by Hossain into Tsui would make the present application obvious. However, even if this incorporation could be made, it still fails to teach, suggest or disclose some features as claimed in the independent claim 1, as described as follows.

1. This incorporation fails to teach, suggest or disclose the use of N-well isolation structures for the LDMOS to prevent the drain current from flowing around the substrate.
2. When the drain of the LDMOS in this incorporation is applied voltage (i.e. operating of LDMOS), dimension of a depletion region in the interface between the p-top layer 108 in and N-well 113 is not uniformly distributed from the drain towards the source, wherein the dimension of depletion region of p-top layer 108 near the drain is larger than that of

depletion region near the source. Namely, the dimension of depletion region of p-top layer 108 is decreasing from the drain towards the source due to the applied voltage' s decreasing from the drain to source. In contrast, the present application has " a third diffusion region comprising a P-field and divided P-fields formed in said extended drain region; wherein said divided P-fields are located nearer to said drain region compared to said P-field" as claimed in the amended claim 1. Besides, from page 7, lines 2-3 in the present application, there discloses "The N-well 30, P-fields 60, and divided P-fields 61 and 62 enable the extended drain region 50 to be depleted before breakdown occurs even though the doping density of the drift region is high." Therefore, an arrangement of dividing the P-field into several separate p-fields of the present application allows the non-uniform distributed depletion region between P-fields and the N-well to be compensated by several separate p-fields because of their different dimension of depletion region. From Fig.2 in the present application, the dimension of p-field with reference number 62 is smaller than that of p-field with reference number 60 so that a dimension of the depletion region near p-field with reference number 62 in a case of the p-filed being not divided is similar to the deposition region near P-field with reference number 60 due to a smaller doped ions contained in the p-field with reference number 62 and a larger N-type diffused ions contained around the P-field with reference number 62 . Therefore, compared to the incorporation suggested by the examiner, the present application allows the depletion region of p-field to be more uniformly distributed from the drain towards the source.

Hence, the present application has a better breakdown voltage distribution than that of the incorporation suggested by the examiner. In brief, the incorporation suggested by the examiner fails to teach, suggest or disclose "a third diffusion region comprising a P-field and divided P-fields formed in said extended drain region; wherein said divided P-fields are located nearer to said drain region compared to said P-field" as claimed and featured in the amended claim 1. That is, the amended claim 1 is patentable over Tsui in view of Hossain.

3. With respect to dependent claims 2-5, they are patentable over Tsui in view of Hossain as matter of law, for at least the following reason they contain all features of their base amended independent claim 1.

CONCLUSION

For at least the foregoing reasons, it is believed that all the pending claims 1-5 of the present application patently define over the prior art and are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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